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ACOUSTIC TESTS IN BROADCASTING HOUSE, MIXER SUITE 1A

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ACOUSTIC TESTS IN BROADCASTING HOUSE, MIXER SUITE 1A

SUMMARY

Acoustic tests were carried out to investigate interference by noise of footsteps with programmes originating in Mixer Suite 1A. The measurements showed that such interference may be reduced to an acceptable level by the use of resilient covers on the floors of adjacent corridors, staircases and offices.

1. INTRODUCTION

The Acoustics Committee referred to Research Department for investigation complaints of interference from noise of footsteps on programmes originating in Mixer 1A, (Acoustics Committee Minutes, July 1966 reference 219.1). Acoustic tests were carried out on the night of 10th August to investigate the origin of the noise, to trace the transmission path involved and to recommend methods for reducing the transmitted level of the noise.

The Mixer Suite 1A is situated adjacent to the Continuity Suites in the main control room area on the first floor of Broadcasting House Extension. Above this area on the second floor are offices opening from a central corridor which is immediately above the Mixer Studio. Adjacent to these areas on both floors are the personnel lifts, goods lifts, cleaner ducts and other service facilities. Complete plans of the area are shown in Fig. 1. The flooring of the corridors and stairs in these areas is of thermoplastic tiling on concrete.

The building is of steel frame construction which constitutes a low-loss transmission path from point to point. To reduce vibrational excitation of the Mixer Studio and Continuity Suites they have been floated on a 25 mm (1 in.) layer of glasswool. The walls are built up from the floor slab and the ceiling rests on the walls. Such a construction is known to be only of limited value, the dynamic stiffness of the glasswool being such that the fundamental resonance is normally found in the region of 100 Hz. In the absence of any previous measurements it is not possible to tell whether there has been a recent deterioration in the isolation which might have led to the complaints.

2. MEASUREMENTS

Similar measurements were carried out in Bush House[1] in 1963 and it was shown that a 0·67 Kg (1½ lb) hammer falling from a height of 150 mm (6 in.) constituted a convenient and portable source of impulsive noise. This method was employed here and the results have been related to the earlier measurements.

An accelerometer was attached to various points, marked A to G in Fig. 1(*a*), in the Mixer Suite and the adjacent Continuity Suite. The output of the accelerometer for several hammer blows at various positions in the corridors surrounding the Mixer Suite was recorded and subsequently analysed by means of a peak programme meter preceded by octave band-pass filters. Fig. 2 shows the acceleration amplitudes measured at various points within Mixer 1A studio for hammer blows at position 5 in the corridor above (see Fig. 1(*b*)). For three positions on the structure the acceleration levels generally exceed those found to be acceptable in the Bush House investigation. The results for position C which was on the wooden framing carrying the absorbing treatment within the Mixer Suite is very greatly in excess of the acceptable values.

Fig. 3 shows similar results for the Mixer 1A cubicle and for two accelerometer positions within Continuity 1 Suite. The results for these areas are only slightly in excess of the acceptable levels, and it seems improbable that complaints in these areas would arise from footfalls in the corridors above. Fig. 4 shows acceleration amplitudes measured in the Mixer Suite and the Continuity No. 1 Suite for hammer blows on the landing outside cubicle 1A (position 3 in Fig. 1(*a*)), and these levels in both the Mixer Studio and Continuity 1 studio, are such that interference with programme would appear to be inevitable in both areas. It is also likely that footsteps noise would be audible in the cubicles but would not constitute an interference with the work being carried out.

In order to determine the extent of the problem, the acceleration amplitudes at a single accelerometer position on the floor slab of the Mixer Studio

(position D in Fig. 1(*a*)) were measured in conjunction with many different excitation positions in the corridors and staircases surrounding the Mixer Suite. The results in Fig. 5 are for six positions which gave levels in excess of the acceptable values and one position giving acceptable levels. Hammer blows at positions more distant than those shown gave levels well below the criterion curve.

Fig. 6 shows acceleration amplitudes measured on the floor slab of the Mixer Studio for two hammer blow positions in the office No. 2088 on the floor above. The measured values for curve (*a*) were for hammer blows direct on to the wood-block floor of the office while those shown for curve (*b*) were taken on the carpeted area immediately adjacent. It will be seen that the addition of carpeting is sufficient to reduce the vibration to acceptable levels.

3. CONCLUSIONS AND RECOMMENDATIONS

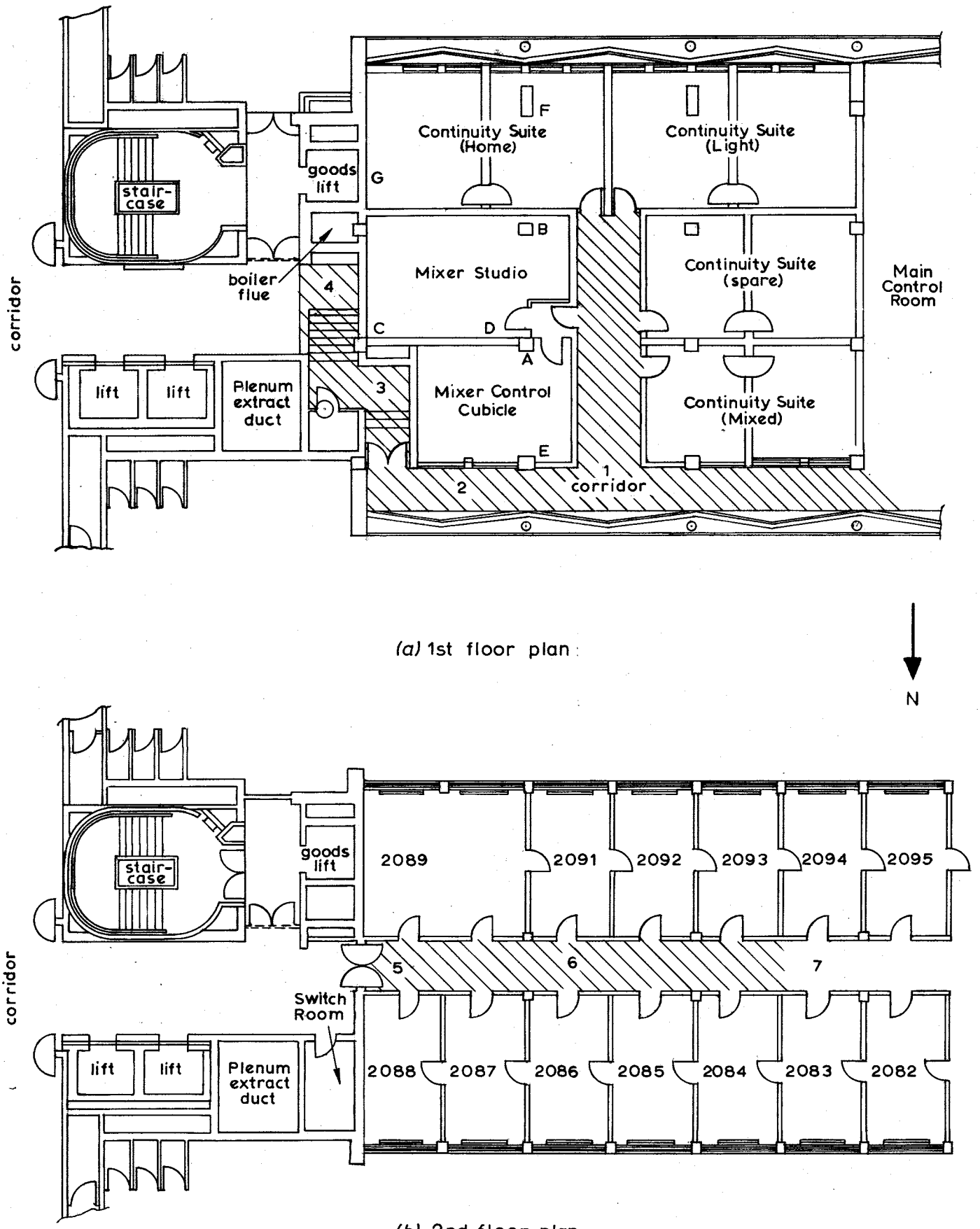
The measurements described in the previous section clearly indicate that noise of footsteps both from the staircase and from the corridor above the Mixer Studio can be a source of interference with programmes originating from Mixer 1A and possibly also from Continuity 1. The measurements obtained from hammer blows in office 2088 indicated that a simple solution to the problem would be the provision of carpeting or a similar resilient material in those parts of the corridor and staircase which are shown shaded in Fig. 1(*a*) and Fig. 1(*b*).

An alternative approach intended to reduce the coupling between the studios and surrounding structural members holds out little prospect of success and would be prohibitively expensive.

It is therefore recommended that some form of resilient floor covering should be provided in the above mentioned areas and this covering should be extended to the uncarpeted areas of rooms 2084 to 2093 inclusive.

4. REFERENCES

1. Investigation into noise problems in Studio S16, Bush House. Research Department Report No. B-076, Serial No. 1963/12.



(a) 1st floor plan

(b) 2nd floor plan

Fig. 1 Broadcasting House extension. Plan view of part of 1st and 2nd floors.

1 0 1 2 3 4 metres

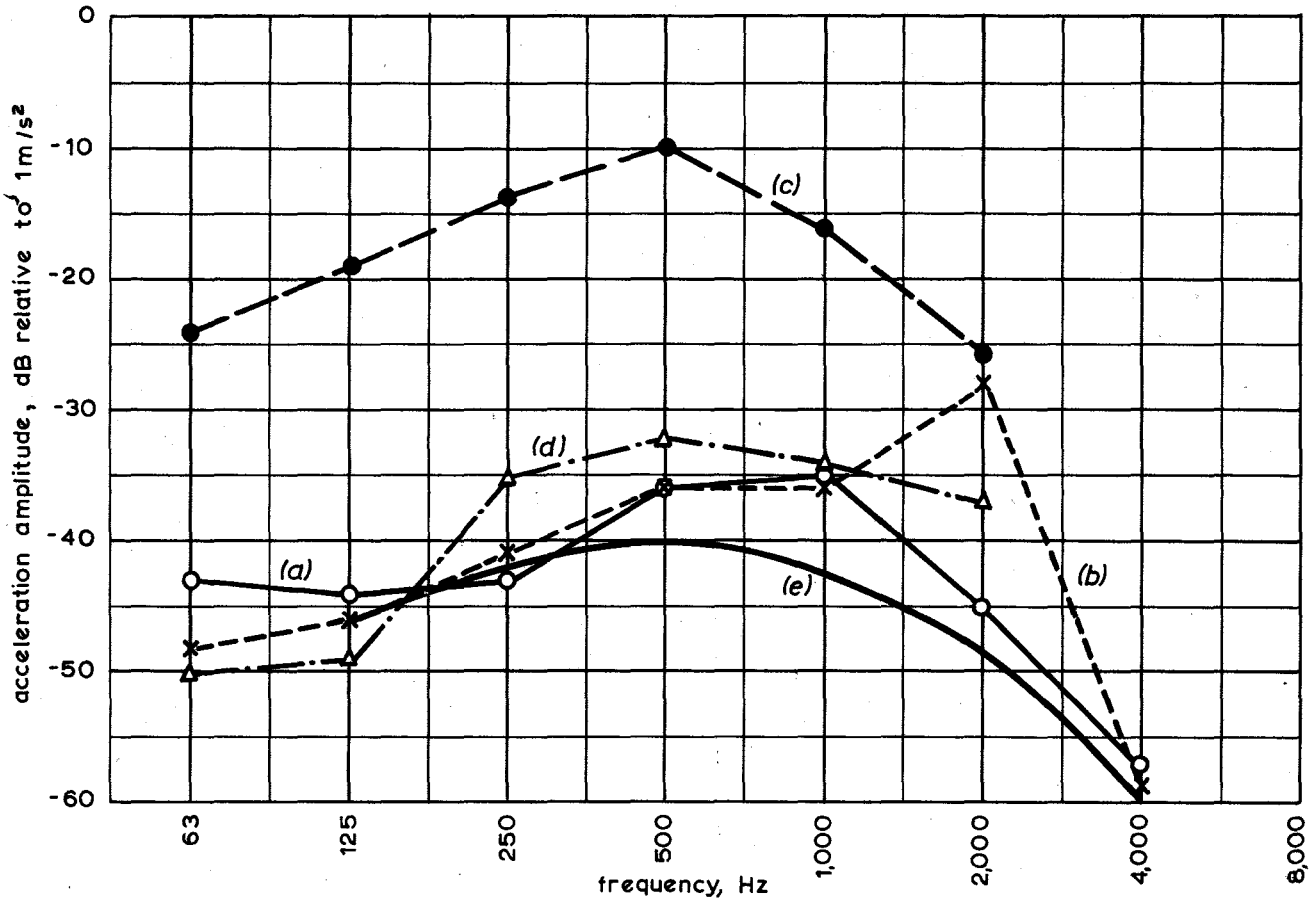


Fig. 2 Acceleration amplitudes in Mixer 1A Studio. (Excitation position 5)

(a) Accelerometer position A. *(b)* Accelerometer position B. *(c)* Accelerometer position C. *(d)* Accelerometer position D. *(e)* Bush House acceptable levels, ref. 1.

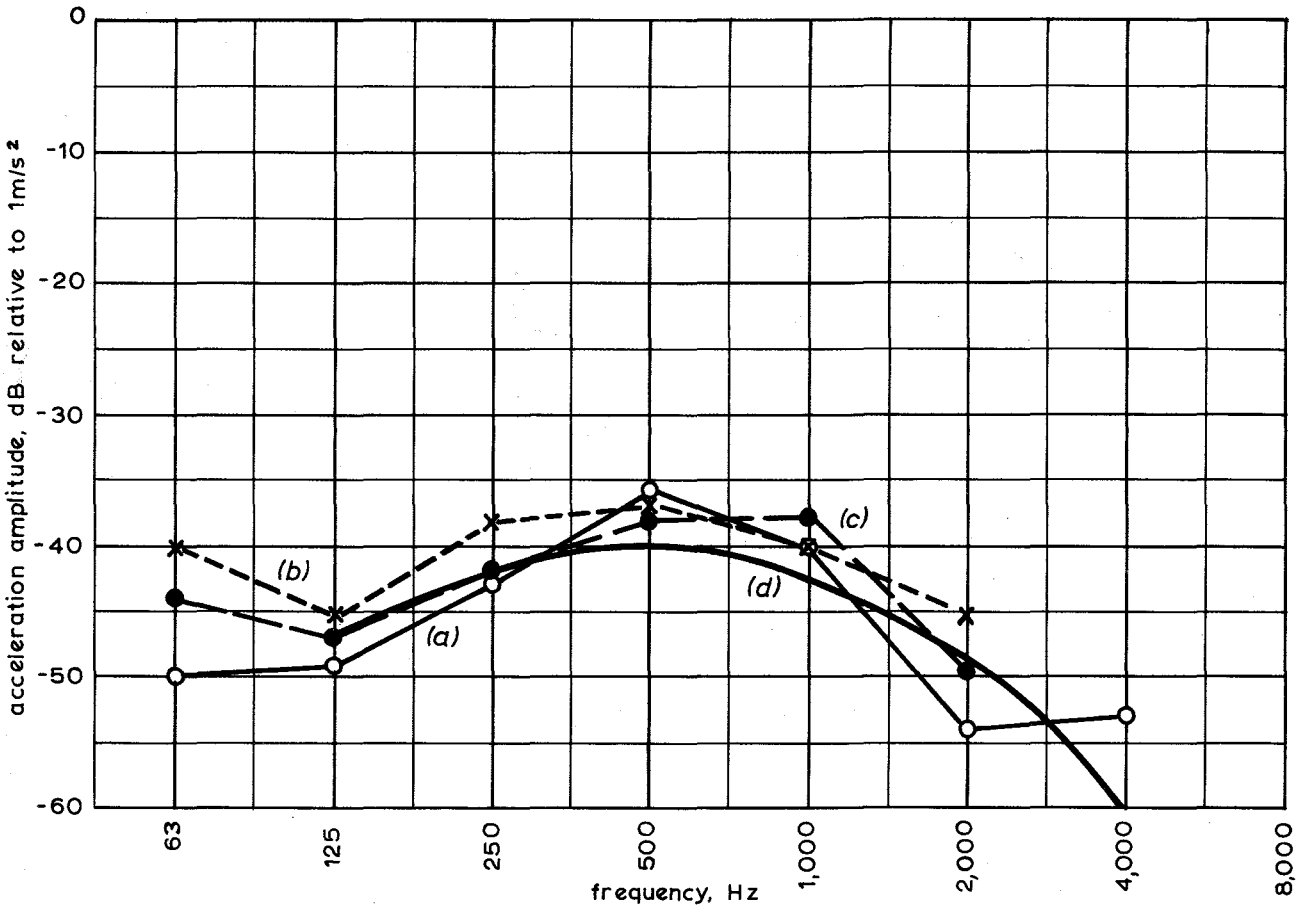


Fig. 3 Acceleration amplitudes in areas adjacent to Mixer 1A Studio (Excitation position 5)

(a) Accelerometer position E. (Mixer 1A Cubicle)
(b) Accelerometer position F. (Continuity 1 Cubicle)
(c) Accelerometer position G. (Continuity 1 Studio)
(d) Bush House acceptable levels. ref 1

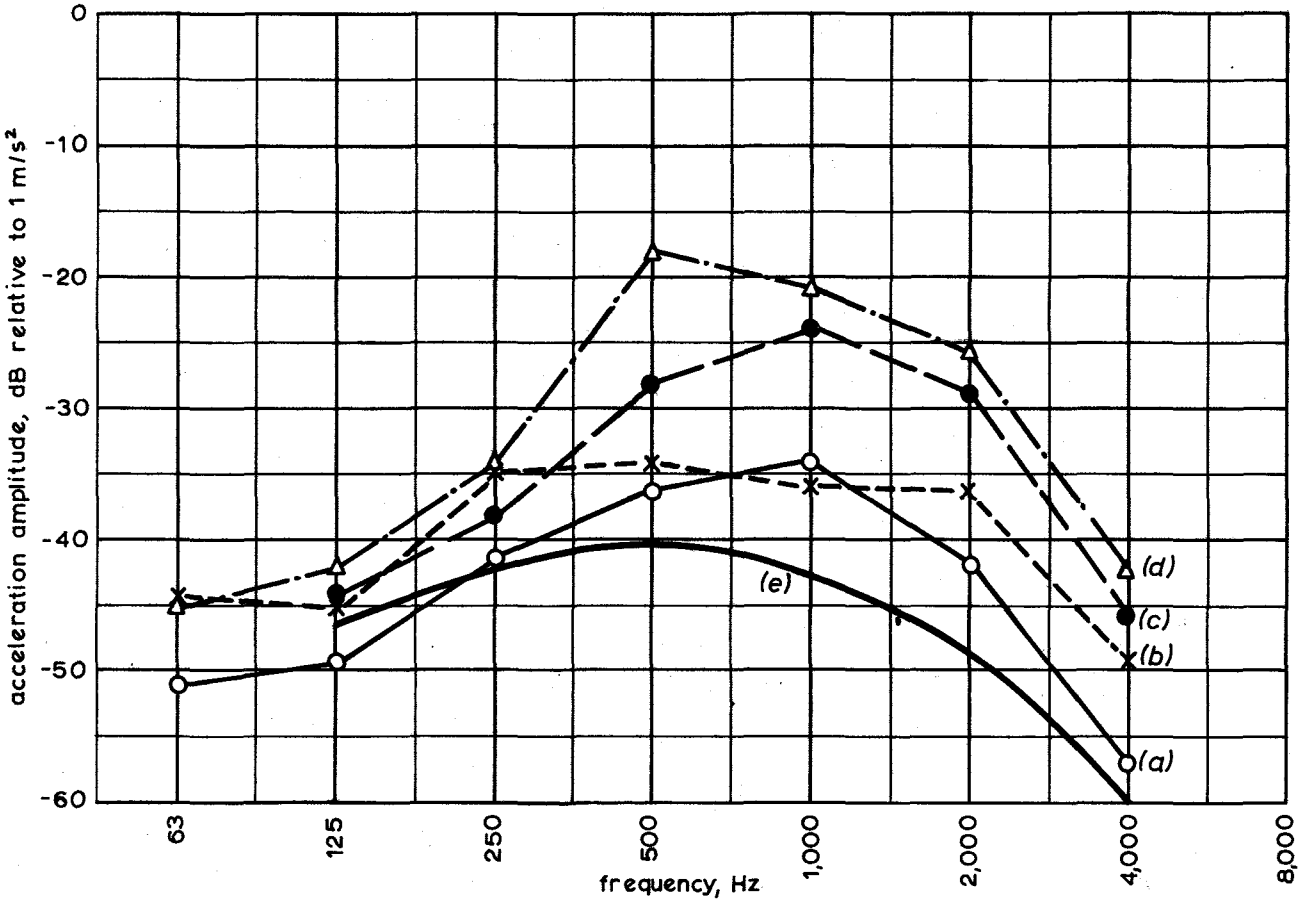


Fig. 4. Acceleration amplitudes in Mixer 1A Studio and neighbouring areas. (Excitation position 3 and accelerometer positions F, G and H)

(a) Mixer 1A Cubicle F. *(b)* Continuity Cubicle (Home) G.
(c) Continuity Studio (Home) H. *(d)* Mixer 1A Studio mean of 3 positions
(e) Bush House acceptable levels, ref. 1.

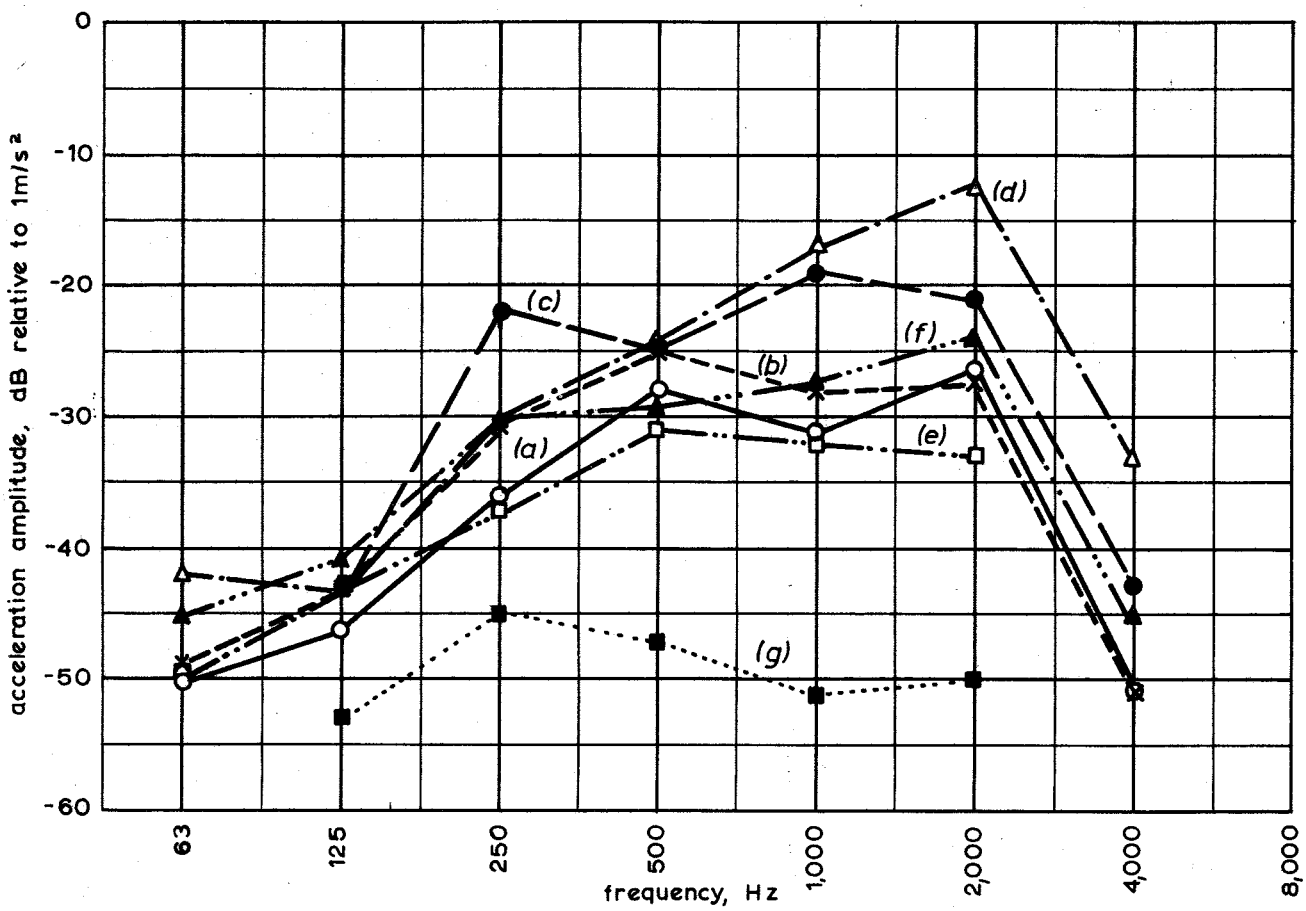


Fig. 5 Acceleration amplitudes on the floor of the microphone skirting in Mixer 1A Studio for excitation points. 1 to 7 (Figs 1*a* and 1*b*)

(a) Position 1. *(b)* Position 2. *(c)* Position 3. *(d)* Position 4. *(e)* Position 5. *(f)* Position 6. *(g)* Position 7.

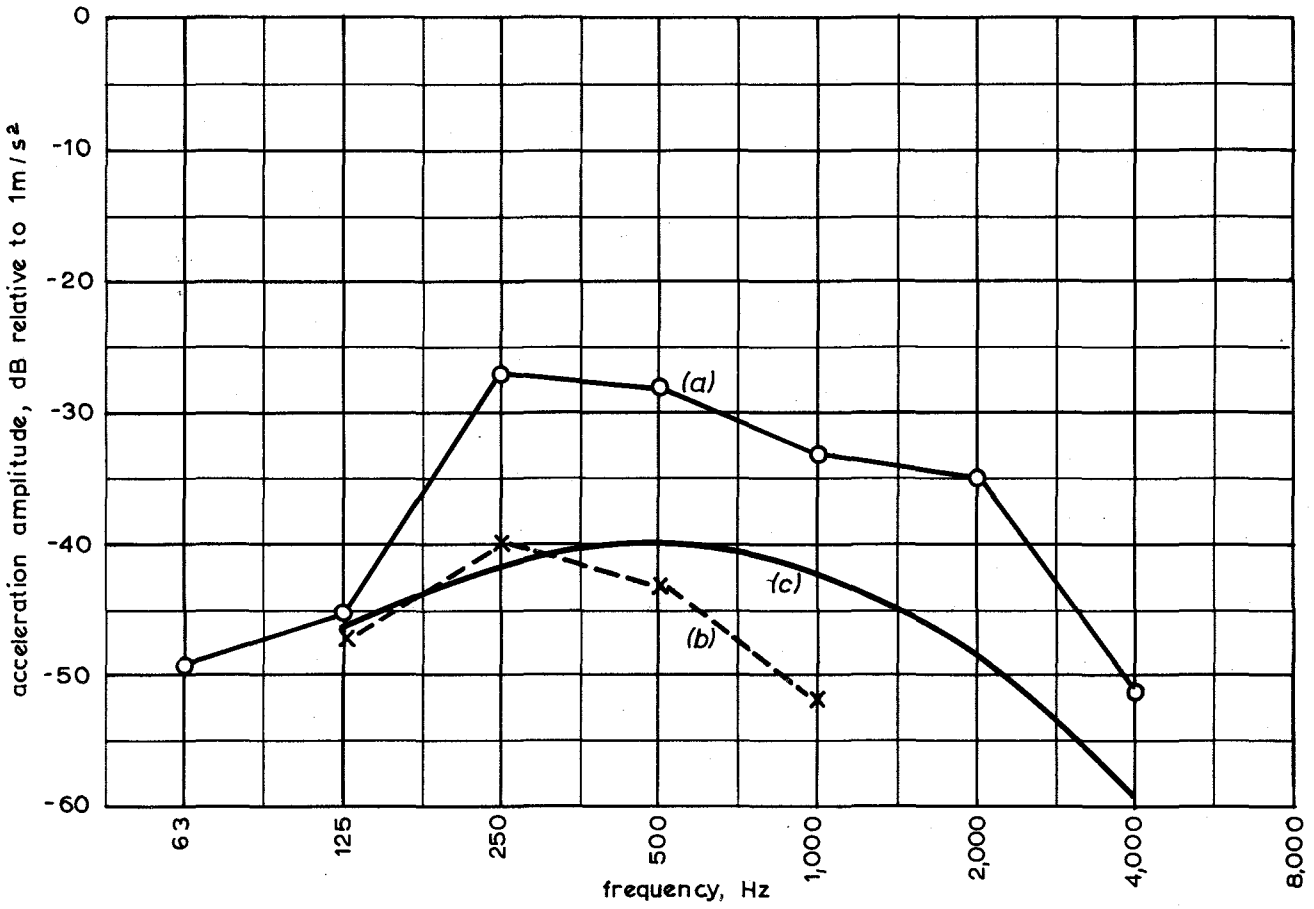


Fig. 6 Acceleration amplitudes on the floor of the microphone skirting. (Excitation - hammer blows in Room 2088)

(a) Hammer blows on wood blocks. *(b)* Hammer blows on carpet.
(c) Acceleration amplitudes found acceptable in Bush House.

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